



**Cromemco**

Specialists in computers and peripherals

# NEWS

FOR DEALERS •  
DISTRIBUTORS

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ISSUE No. 2 NOVEMBER 1976

## FACTORY SUPPORT FOR YOU

At Cromemco we intend to support you in every way we can. First and foremost this means we give you and your customers quality products that offer performance unequaled in the industry.

Further, we want to help you sell our products. We do this by producing high-quality full-color ads, by purchasing prime magazine advertising space, and by providing full-color reproductions of selected ads in the form of posters for your store.

NEW Z-80 CPU POSTER - This month you will be receiving posters of our new Z-80 CPU card. This card has been well received. And it will be reviewed in the December issue of Interface Age.

Expect to see a lot of customer interest in this card.

## OUR NEW 4KZ 4K STATIC MEMORY OFFERS GUARANTEED 4 MHz SPEED AND MEMORY BANK SELECT

Our 4KZ static memory board is now in production. It is unique in two ways: first, it uses a novel scheme of address anticipation to give reliable high-speed operation at 4 MHz with our fast Z-80 CPU card (which operates at 4 MHz). Addresses are actually applied to the memory chips before address information appears on the address bus. To accomplish this, on-board address counters are incremented at the end of each machine cycle in preparation for the subsequent cycle.

In this way proven, reliable, low-power 21L02 memory chips can be used at 4 MHz.

A wait state is automatically inserted only when two consecutive addresses are not sequential. And, of course, our 4KZ board will provide ultra-reliable operation at 2 MHz clock rates with no wait states at all.

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## HOW TO GET A HALF MEGABYTE OF MEMORY

The second unique feature of the new Z-80 board is bank select. Many of your customers have probably already found that 64K of memory is just not enough for some applications.

Well, our 4KZ board can be organized into as many as 8 banks of 64K each. An 8-position switch on each memory board selects the bank(s) in which the board resides. Output port number 100 (octal) selects the active bank.

Imagine a sale of a half megabyte of memory to one customer! With bank select this is truly possible. And this Cromemco innovation will gain even more importance with the announcement of our 16KZ memory board with bank select next year.

The 4KZ memory board is available now. Kit list price is \$195. Assembled list price is \$295.

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#### SPACEWAR FOR THE DAZZLER!

Perhaps the most famous computer game of all time -- SPACEWAR -- is now available from Cromemco.

This is a two-player game that uses two Cromemco JS-1 (joystick) game consoles. Using the JS-1 joystick, the player controls the orientation and thrust of the corresponding rocket. Then with the switches on the JS-1, the player fires missiles or transcends into hyperspace. Sense switches can select a sun with or without gravity.

SPACEWAR itself requires a little over 4K of memory with another 2K required for Dazzler picture storage.

Our dealers frequently request more software for the Dazzler. In response to those requests, Cromemco has made and is making a major investment in software. SPACEWAR now joins our game of CHASE! as another first-rate two-person computer game.

List price for a paper tape list of SPACEWAR with playing instructions is \$15.

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#### AN EASY CURE

EXECUTING CODE FROM BYTESAVER - PROBLEM CAUSED BY IMSAI FRONT PANEL - If you have had customers reporting difficulties when executing output instructions from a Bytesaver in an IMSAI, the cause can be traced to the IMSAI front panel circuitry - and there is an easy cure.

The basic problem is that the IMSAI front panel generates an MWRITE signal (on pin 68 of the S-100 bus) not only for memory write instructions but also for output instructions.

When an output instruction is executed from Bytesaver and if the high-order three bits of the output port address are the same as the high-order three bits ( $A_{15}$ ,  $A_{14}$ , and  $A_{13}$ ) of the Bytesaver address, the Bytesaver assumes, in good faith, that a memory write operation has occurred.

As a result, when the computer attempts to execute the next consecutive instruction, it receives a Restart 7 instruction (all ones) since the Bytesaver is now in write mode rather than in read mode.

The IMSAI CPA schematic diagram shows how two gates of U25 can be added to the MWRITE generation circuitry to correct this problem. Your customers would be well-advised to incorporate IMSAI's suggested circuitry into their front panel to avoid seemingly "mysterious" software crashes not only with the Bytesaver but with other memory boards as well.

It is interesting to note that this problem will not occur when using our Z-80 CPU card in place of the IMSAI 8080 card. A special feature of our



Z-80 card is that circuitry has been added to override the erroneous MWRITE signal generated by the IMSAI front panel. In fact, our Z-80 card is unique in that no front panel circuitry at all is required to generate MWRITE.

This is a particularly important point for customers who are looking for a CPU card to use in a stand-alone system.

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#### HOW TO USE D+7A WITH OLDER DAZZLERS

The current model of the Dazzler (REV C) is completely compatible with our D+7A analog interface in that D-to-A and A-to-D conversions can take place while the Dazzler is displaying a picture. Customers with the older REV B Dazzler may observe some "tearing" of the Dazzler picture if they attempt to perform analog I/O (e.g., from a JS-1 joystick console) while displaying a Dazzler picture.

The cure for this is very simple. Just remove pin 10 of IC29 on Dazzler REV B Board 1. The Dazzler REV B is then completely compatible with the D+7A interface.

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#### IMPORTANT D+7A RESISTOR CHANGE

We have found that unreliable A/D conversion can occur in some D+7A boards in which the Motorola MLM 310 is used for IC20.

To achieve reliable conversion in these boards, R31 (a 100-ohm resistor) should be replaced by a 1K resistor.

This change is not required in D+7A boards supplied with the National Semiconductor LM310N.

All D+7A boards now being shipped from the factory use a 1K resistor for R31.

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#### NEW Z-1 COMPUTER AD

On the back page of this issue is an advance look at our new ad on the fantastic Cromemco Z-1 computer.

The ad will appear in full color in the January issue of BYTE magazine.

As the ad says, the Z-1 is the fastest and most powerful microcomputer there is.

We think there will be substantial interest in the Z-1 by your more technical customers. It is what they need to get into the Z-80 microprocessor in the easiest and quickest way.

Cromemco has broad support for the Z-1 and will soon have even more.

For additional Z-1 info, see the October issue of this newsletter.

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# This is the industry's most powerful microcomputer (it's also a powerful Z-80 $\mu$ P development system)

## Uses high-speed Z-80 $\mu$ P

You see here a major new development in microcomputers: the Cromemco Z-1.

**It is the fastest and most powerful microcomputer available.**

It gets its speed and power from a selected version of the new Z-80 microprocessor that can operate at a 4 MHz clock rate. (The Z-1 also lets you switch to 2 MHz to be compatible with older systems.)

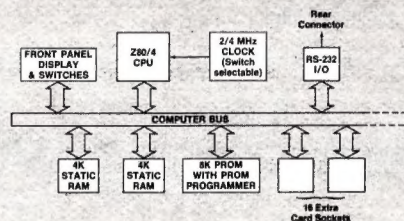
## $\mu$ P development system

In addition to being a powerful microcomputer the Z-1 is a major  $\mu$ P development system. It will give you a big head start in developing your circuits around the Z-80  $\mu$ P.

All you need do is plug your breadboards into the Z-1's 16 or more extra sockets. You're right into the computer bus.

## Broad "S-100" support

What's more, the Z-1 offers you all kinds of peripherals and software. It uses the standard "S-100"



bus supported by over a dozen manufacturers. And all Cromemco peripherals (PROM memory and programmer, RAM memory, analog I/O, color TV interface, etc.) just plug into the Z-1's extra sockets.

Cromemco also provides complete software support: a monitor, assembler, BASIC interpreter and more to come soon.

Another thing: you can bet the Z-1 won't be obsolete. Future CPU cards can plug in for the present CPU card.

## Not a kit

The Z-1 comes completely assembled and tested. It's a quality, commercial-grade microcomputer. It

is not available as a kit. Just plug it into the 110-volt line and you're ready to go.

The Z-1's ready, too. It's being shipped. And for all you get, the low \$2495 price is a pleasant surprise. It's especially pleasant when you compare it with the price of any complete, assembled microcomputer with all the Z-1's features.

Call now and get our brochure on this new system which is so important in working with the Z-80.

## Z-1 components

- Z-80/4 CPU
- 8K static RAM
- Capacity for 8K PROM
- PROM programmer
- Resident monitor in PROM
- RS-232 I/O
- Full 22-slot motherboard and connectors
- Fan installed
- Not a kit; completely assembled



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